

General Description

The AOZ8231A is a one-line bi-directional transient voltage suppressor diode designed to protect voltage sensitive electronics from high transient conditions and ESD.

This device incorporates one TVS diode in an ultra-small DFN 1006 package. It may be used to meet the ESD immunity requirements of EC 61000-4-2, Level 4 (± 15 kV air, ± 8 kV contact discharge).

The AOZ8231A comes in a RoHS compliant, Halogen-Free DFN 1.0 mm x 0.6 mm package and is rated over a -40 °C to $+85$ °C ambient temperature range.

The ultra-small 1.0 mm x 0.6 mm x 0.5 mm DFN package makes it ideal for applications where PCB space is a premium. The small size and high ESD protection makes it ideal for protecting voltage sensitive electronics from high transient conditions and ESD.

Applications

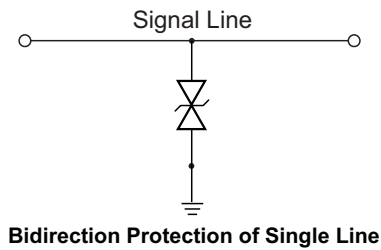
- Portable handheld devices
- Keypads, data lines, buttons
- Notebook computers
- Digital Cameras
- Portable GPS
- MP3 players

Features

- ESD protection for high-speed data lines
 - AOZ8231ADI-02:
 - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
 - Human Body Model (HBM) ± 30 kV
 - IEC 61000-4-5 (Lightning) 6 A (8/20 μ S)
 - IEC 61000-4-4 (EFT) 40 A
 - AOZ8231ADI-03:
 - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
 - Human Body Model (HBM) ± 30 kV
 - IEC 61000-4-5 (Lightning) 6 A (8/20 μ S)
 - IEC 61000-4-4 (EFT) 40 A
 - AOZ8231ADI-05:
 - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
 - Human Body Model (HBM) ± 30 kV
 - IEC 61000-4-5 (Lightning) 5 A (8/20 μ S)
 - IEC 61000-4-4 (EFT) 40 A
 - AOZ8231ADI-08:
 - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
 - Human Body Model (HBM) ± 30 kV
 - IEC 61000-4-5 (Lightning) 5 A (8/20 μ S)
 - IEC 61000-4-4 (EFT) 40 A
 - AOZ8231ADI-12:
 - Exceeds: IEC 61000-4-2 (ESD) ± 30 kV (air), ± 30 kV (contact)
 - Human Body Model (HBM) ± 30 kV
 - IEC 61000-4-5 (Lightning) 4 A (8/20 μ S)
 - IEC 61000-4-4 (EFT) 40 A
 - AOZ8231ADI-24:
 - Exceeds: IEC 61000-4-2 (ESD) ± 18 kV (air), ± 15 kV (contact)
 - Human Body Model (HBM) ± 15 kV
 - IEC 61000-4-5 (Lightning) 2.5 A (8/20 μ S)
 - IEC 61000-4-4 (EFT) 40 A
- Small package saves board space
- Low insertion loss
- Low clamping voltage
- Low operating voltage
- Pb-free device



Typical Application



Pin Configuration



Ordering Information

| Part Number | Ambient Temperature Range | Package | Environmental |
|---------------|---------------------------|---------------|---------------|
| AOZ8231ADI-02 | -40 °C to +85 °C | DFN 1.0 x 0.6 | Green Product |
| AOZ8231ADI-03 | | | |
| AOZ8231ADI-05 | | | |
| AOZ8231ADI-08 | | | |
| AOZ8231ADI-12 | | | |
| AOZ8231ADI-24 | | | |



AOS Green Products use reduced levels of Halogens, and are also RoHS compliant. Please visit www.aosmd.com/media/AOSGreenPolicy.pdf for additional information.

Absolute Maximum Ratings

Exceeding the Absolute Maximum ratings may damage the device.

| Parameter | Rating for AOZ8231ADI | | | | | |
|---|-----------------------|---------|---------|---------|---------|---------|
| | -02 | -03 | -05 | -08 | -12 | -24 |
| VP – VN | 2.5 V | 3.3 V | 5 V | 8 V | 12 V | 24 V |
| Peak Pulse Current, $t_p = 8/20 \mu s$ | 6 A | 6 A | 5 A | 5 A | 4 A | 2.5 A |
| Storage Temperature (T_S) | -65 °C to +150 °C | | | | | |
| ESD Rating per IEC61000-4-2, Contact ⁽¹⁾ | ± 30 kV | ± 30 kV | ± 30 kV | ± 30 kV | ± 30 kV | ± 15 kV |
| ESD Rating per IEC61000-4-2, Air ⁽¹⁾ | ± 30 kV | ± 30 kV | ± 30 kV | ± 30 kV | ± 30 kV | ± 18 kV |
| ESD Rating per Human Body Model ⁽²⁾ | ± 30 kV | ± 30 kV | ± 30 kV | ± 30 kV | ± 30 kV | ± 15 kV |

Notes:

- IEC 61000-4-2 discharge with $C_{Discharge} = 150 \text{ pF}$, $R_{Discharge} = 330 \Omega$.
- Human Body Discharge per MIL-STD-883, Method 3015 $C_{Discharge} = 100 \text{ pF}$, $R_{Discharge} = 1.5 \text{ k}\Omega$.

Maximum Operating Ratings

| Parameter | Rating |
|--------------------------------|-------------------|
| Junction Temperature (T_J) | -40 °C to +125 °C |

Electrical Characteristics

T_A = 25 °C unless otherwise specified.

| Symbol | Parameter | Diagram |
|------------------|---|---------|
| I _{PP} | Reverse Peak Pulse Current, (t _{period} = 100 ns, t _r = 1 ns) | |
| V _{CL} | Clamping Voltage @ I _{PP} | |
| V _{RWM} | Working Peak Reverse Voltage | |
| I _R | Maximum Reverse Leakage Current | |
| V _{BR} | Breakdown Voltage | |
| C _J | Capacitance @ V _R = 0 and f = 1 MHz | |

| Device | Device Marking | V _{RWM} (V) Max. | V _{BR} (V) Min. @ 1mA | I _R (μA) Max. | V _{CL} Max. ⁽³⁾ | | | C _J (pF) ⁽³⁾ | | |
|---------------|----------------|---------------------------|--------------------------------|--------------------------|-------------------------------------|-----------------------|------------------------|------------------------------------|------|------|
| | | | | | I _{PP} = 1 A | I _{PP} = 5 A | I _{PP} = 12 A | Min. | Typ. | Max. |
| AOZ8231ADI-02 | P | 2.5 | 3.0 | 0.1 | 6.5 | 9.0 | 12.5 | 4.4 | 5.5 | 7.0 |
| AOZ8231ADI-03 | D | 3.3 | 3.7 | 0.1 | 7.5 | 10.0 | 13.5 | 4.4 | 5.5 | 7.0 |
| AOZ8231ADI-05 | E | 5.0 | 5.5 | 0.1 | 10.5 | 13.5 | 15.5 | 10.4 | 13.0 | 14.0 |
| AOZ8231ADI-08 | Y | 8.0 | 9.5 | 0.1 | 15.0 | 18.0 | 22.5 | 19.0 | 23.0 | 27.0 |
| AOZ8231ADI-12 | F | 12.0 | 13.0 | 0.1 | 20.0 | 23.0 | 26.0 | 10.4 | 13.0 | 14.0 |
| AOZ8231ADI-24 | R | 24.0 | 27.0 | 0.1 | 35.0 | 38.0 | 39.0 | 9.6 | 12.0 | 15.0 |

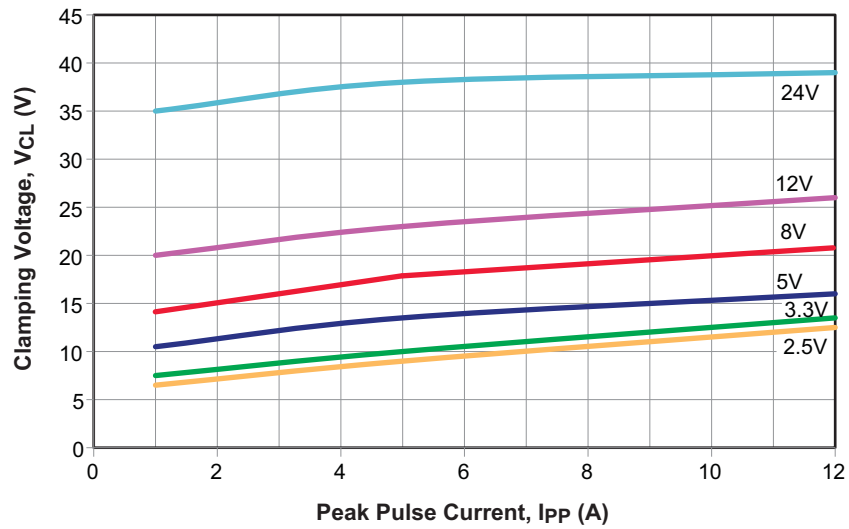
Note:

3. Guaranteed by design and characterization.

Typical Performance Characteristics

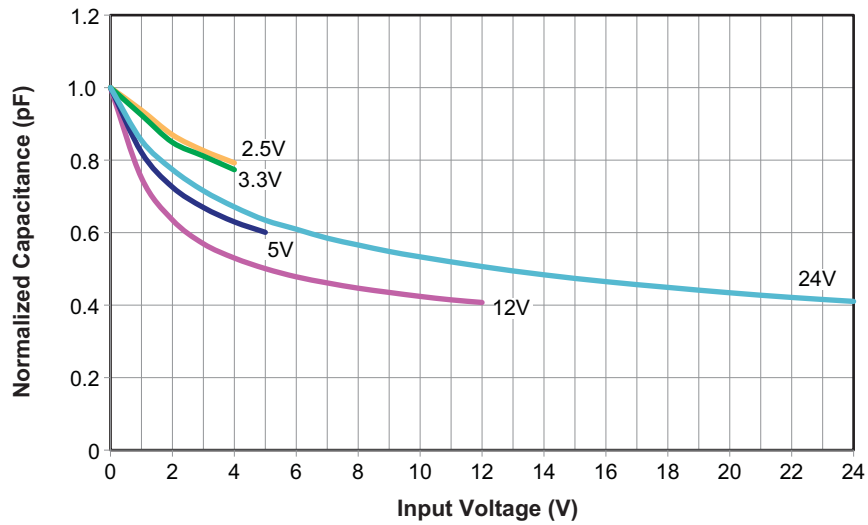
Clamping Voltage vs. Peak Pulse Current

($t_{\text{period}} = 100 \text{ ns}$, $t_r = 1 \text{ ns}$)

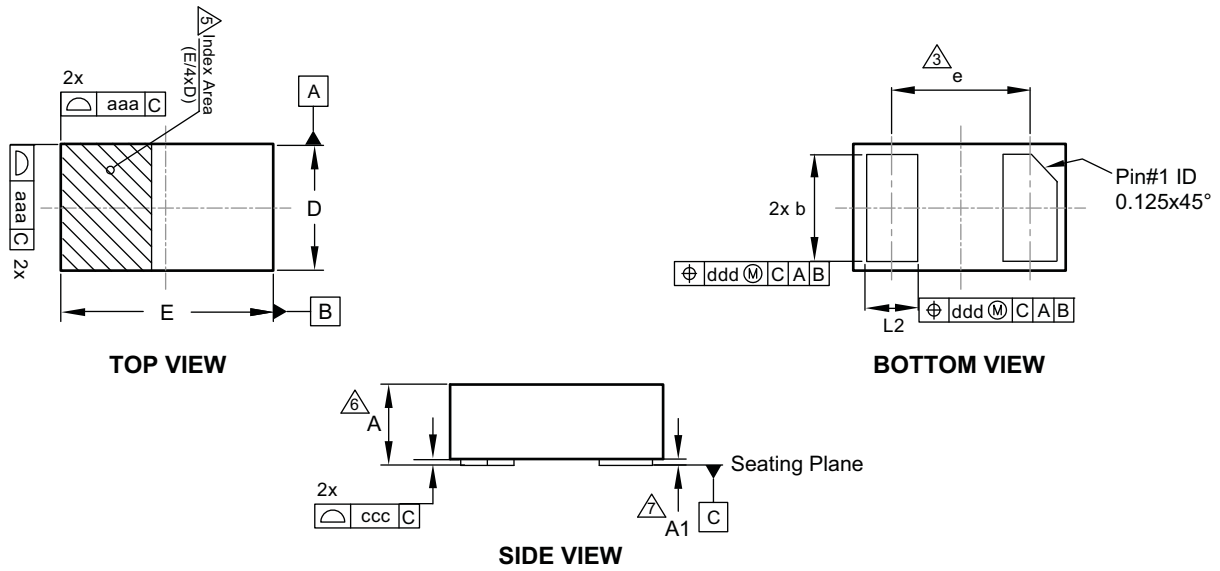


Typical Variation of C_{IN} vs. V_R

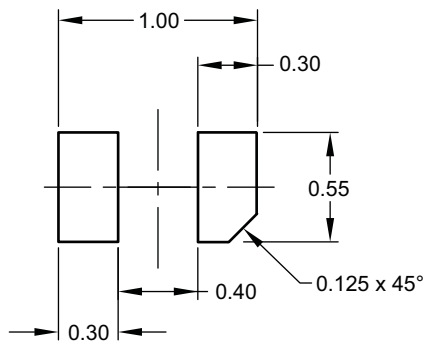
($f = 1 \text{ MHz}$, $T = 25 \text{ }^\circ\text{C}$)



Package Dimensions, DFN 1.0 x 0.6



RECOMMENDED LAND PATTERN



Dimensions in millimeters

| Symbols | Min. | Nom. | Max. |
|---------|----------|------|------|
| A | 0.47 | 0.51 | 0.55 |
| A1 | 0.00 | 0.02 | 0.05 |
| b | 0.45 | 0.50 | 0.55 |
| D | 0.60 BSC | | |
| E | 1.00 BSC | | |
| e | 0.65 BSC | | |
| L | 0.20 | 0.25 | 0.30 |
| aaa | 0.05 | | |
| ccc | 0.03 | | |
| ddd | 0.10 | | |

Dimensions in inches

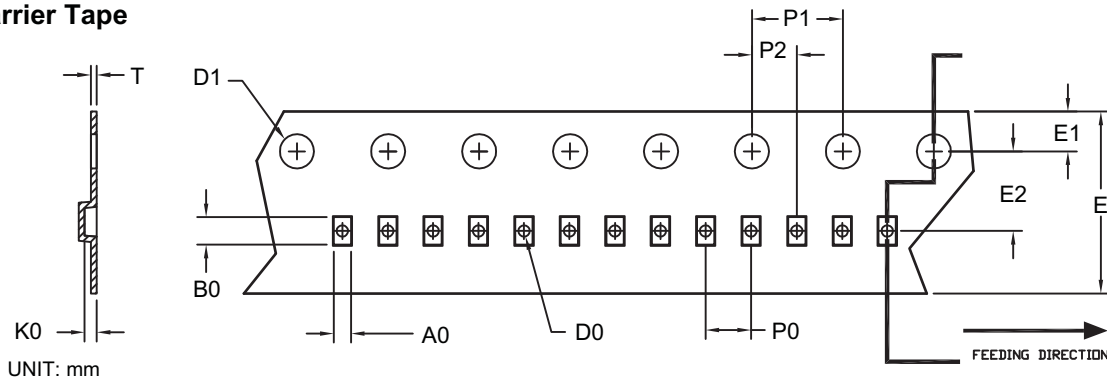
| Symbols | Min. | Nom. | Max. |
|---------|-------|-------|-------|
| A | 0.019 | 0.020 | 0.022 |
| A1 | 0.000 | 0.001 | 0.002 |
| b | 0.018 | 0.020 | 0.022 |
| D | 0.024 | | |
| E | 0.039 | | |
| e | 0.026 | | |
| L | 0.008 | 0.010 | 0.012 |
| aaa | 0.002 | | |
| ccc | 0.001 | | |
| ddd | 0.004 | | |

Notes:

1. Dimensions and tolerancing conform to ASME Y14.5-2009.
2. All dimensions are in millimeters.
3. "e" represents the terminal grid pitch.
4. N is the total number of terminals.
5. A visual index feature must be located within the hatched area. Typical index feature (chamfer) must be located on the edge of the Pin#1 feature.
6. This dimension includes stand-off height "A1" and packaged body thickness, but does not include attached feature e.g. external heatsink or chip capacitors, an internal heatslug is not considered as attached feature.
7. Dimension "A1" is primarily terminal plating, and does not include small metal protrusions.

Tape and Reel Dimensions, DFN 1.0 x 0.6

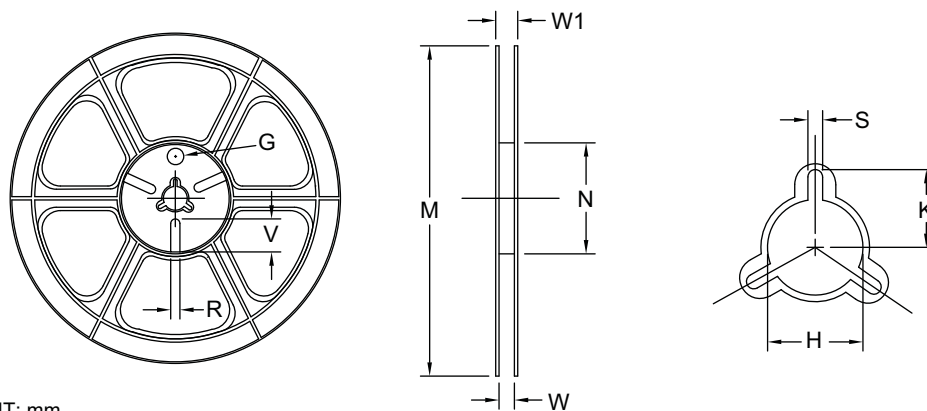
Carrier Tape



UNIT: mm

| Option | Package | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|--------|--|---------------|---------------|---------------|---------------|---------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| A | DFN 1.0x0.6/ DFN 1.0x0.6A (8 mm) | 0.69 ±0.05 | 1.19 ±0.05 | 0.66 ±0.05 | 0.40 ±0.05 | 1.50 ±0.10 | 8.00 +0.3/-0.1 | 1.75 ±0.10 | 3.50 ±0.05 | 2.00 ±0.05 | 4.00 ±0.10 | 2.00 ±0.05 | 0.23 ±0.02 |
| B | DFN 1.0x0.6/ DFN 1.0x0.6A (8 mm) | 0.65 ±0.04 | 1.05 ±0.04 | 0.61 ±0.04 | 0.40 ±0.05 | 1.50 ±0.10 | 8.00 +0.3/-0.1 | 1.75 ±0.10 | 3.50 ±0.05 | 2.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.05 | 0.20 ±0.05 |

Reel

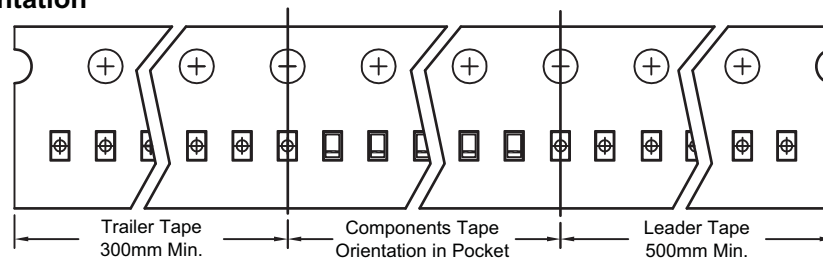


UNIT: mm

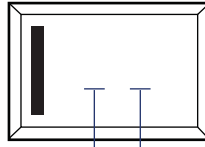
| Tape Size | Reel Size | M | N | W | W1 | H | K | S | G | R | V |
|-----------|-----------|--------------|-----------|----------------|--------------|---------------|--------------|-------------|-----|-----|-----|
| 8mm | ø178 | ø178 ±0.5 | ø55 ±1 | 8.4 +1.5/-0 | Max. 14.4 | ø13.0 ±0.5 | Max. 10.1 | 2.0 ±0.5 | N/A | N/A | N/A |

Leader / Trailer & Orientation

TVS
Unit Per Reel:
10000pcs



Part Marking



Product Number Code Date Code

AOZ8231ADI_02 = **P**
 AOZ8231ADI_03 = **D**
 AOZ8231ADI_05 = **E**
 AOZ8231ADI_08 = **Y**
 AOZ8231ADI_12 = **F**
 AOZ8231ADI_24 = **R**

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